What is claimed is:

1. A method of supplying solvent to a chromatographic system comprising:

providing a hydraulic cylinder comprising:

an inlet chamber;

an outlet chamber;

a primary piston disposed between said inlet chamber and said outlet chamber, ;

a secondary piston chamber; and

a secondary piston disposed in said secondary piston chamber, wherein a cross-sectional area of said primary piston is larger than a cross-sectional area of said secondary piston, such that pressure in said secondary piston chamber is greater than a pressure in said inlet chamber, and a flow rate through said secondary piston chamber is less than a flow rate through said outlet chamber;

providing a pump, said pump supplying pressurized hydraulic fluid;

driving said primary piston with said pressurized hydraulic fluid;

activating said secondary piston by said primary piston;

moving and pressurizing said solvent; and

supplying said pressurized solvent to said chromatographic system from said hydraulic cylinder.

2. The method of claim 1 further comprising supplying solvent to said chromatographic system from said hydraulic cylinder at a substantially constant flow rate.

3. The method of claim 1, wherein a ratio of said cross-sectional area of said primary piston to said cross-sectional area of said secondary piston is at least 4:1.

4. The method of claim 1, further comprising measuring the position of said primary piston and said secondary piston with a linear position transducer.

5. The method of claim 1, further comprising regulating hydraulic fluid flow to either said inlet chamber or said outlet chamber with a multiple port valve, thereby controlling said primary piston to operate in one of a pump mode and a refill mode.

6. The method of claim 1, further comprising:

measuring a pressure in said inlet chamber of said hydraulic cylinder with a first pressure transducer;

measuring a pressure in said outlet chamber of said hydraulic cylinder with a second pressure transducer; and

computing a pressure difference across said primary piston and said pressure in said secondary piston chamber using the measurements of said first pressure transducer and said second pressure transducer.

7. The method of claim 6, further comprising said pump supplying said pressurized hydraulic fluid at a high flow rate while said pressure difference is below a threshold and supplying said pressurized hydraulic fluid at a lower flow rate while said pressure difference is at and above said threshold.

8. The method of claim 1, further comprising controlling said hydraulic amplifier system with a system controller.

9. The method of claim 1, further comprising regulating the supply of solvent to said chromatographic system with an outlet check valve.

10. The method of claim 1, further comprising supplying solvent to said secondary piston chamber with an inlet check valve.

11. A method for supplying solvent to a chromatographic system comprising:

supplying a first pressurized solvent to said chromatographic system with a first hydraulic cylinder;

supplying pressurized hydraulic fluid at a substantially constant rate from a first pump to actuate a primary piston of said first hydraulic cylinder;

supplying a second pressurized solvent to said chromatographic system with a second hydraulic cylinder; and

supplying pressurized hydraulic fluid at a substantially constant rate from a second pump to actuate a primary piston of said second hydraulic cylinder,

wherein said first and second hydraulic cylinders comprise:

an inlet chamber;

an outlet chamber;

a primary piston disposed between said inlet chamber and said outlet chamber, said primary piston being driven by said pressurized hydraulic fluid;

a secondary piston chamber; and

a secondary piston disposed in said secondary piston chamber, said secondary piston being activated by said primary piston for moving and pressurizing said pressurized solvent; wherein a cross-sectional area of said primary piston is larger than a cross-sectional area of said secondary piston, such that a pressure in said secondary piston chamber is greater than a pressure in said inlet chamber, and a flow rate through said secondary piston chamber is less than a flow rate through said outlet chamber.

12. The method of claim 11, further comprising said first hydraulic cylinder supplying said first solvent to said chromatographic system at a first constant flow rate and said second hydraulic cylinder supplying said second solvent to said chromatographic system at a second constant flow rate.

13. The method as claimed in claim 11, wherein a ratio of said cross-sectional area of said primary piston to said cross-sectional area of said secondary piston is at least 4:1.

14. The method as claimed in claim 11, further comprising:

measuring the position of said primary piston and said secondary piston of said first hydraulic cylinder with a first linear position transducer; and

measuring the position of said primary piston and said secondary piston of said secondary hydraulic cylinder with a second linear position transducer.

15. The method as claimed in claim 11, further comprising:

regulating hydraulic fluid flow to either said inlet chamber or said outlet chamber of said first hydraulic cylinder with a first multiple port valve, thereby controlling said primary piston of said first hydraulic cylinder to operate in one of a pump mode and a refill mode; and

regulating hydraulic fluid flow to either said inlet chamber or said outlet chamber of said second hydraulic cylinder with a second multiple port valve, thereby controlling said primary piston of said second hydraulic cylinder to operate in one of a pump mode and a refill mode

16. The method as claimed in claim 11, further comprising:

measuring a pressure in said inlet chamber of said first hydraulic cylinder with a first pressure transducer ;

measuring a pressure in said outlet chamber of said first hydraulic cylinder with a second pressure transducer,

computing a pressure difference across said primary piston of said first hydraulic cylinder using the measurements of said first pressure transducer and said second pressure transducer;

measuring a pressure in said inlet chamber of said second hydraulic cylinder with a third pressure transducer;

measuring a pressure in said outlet chamber of said second hydraulic cylinder with a fourth pressure transducer; and

computing a pressure difference across said primary piston of said second hydraulic cylinder using the measurements of said third pressure transducer and said fourth pressure transducer.

17. The method of claim 16 further comprising:

said first pump supplying said pressurized hydraulic fluid at a first high flow rate while said pressure difference across said primary piston of said first hydraulic cylinder is below a first threshold;

said first pump supplying said pressurized hydraulic fluid at a first lower flow rate while said pressure difference across said primary piston of said first hydraulic cylinder is at and above said first threshold;

said second pump supplying said pressurized hydraulic fluid at a second high flow rate while said pressure difference across said primary piston of said second hydraulic cylinder is below a second threshold; and

said second pump supplying said pressurized hydraulic fluid at a second lower flow rate while said pressure difference across said primary piston of said second hydraulic cylinder is at and above said second threshold.

18. The method as claimed in claim 11, further comprising controlling said hydraulic amplifier system with a system controller.

19. The method as claimed in claim 11, further comprising:

regulating the supply of said first solvent to said chromatographic system with a first outlet check valve attached to said first hydraulic cylinder; and

regulating the supply of said second solvent to said chromatographic system with a second outlet check valve attached to said second hydraulic cylinder.

20. The method of claim 11, further comprising:

supplying said first solvent to said secondary piston chamber of said first hydraulic cylinder with a first inlet check valve attached to said first hydraulic cylinder; and

supplying said second solvent to said secondary piston chamber of said second hydraulic cylinder with a second inlet check valve attached to said second hydraulic cylinder .

21. The method of claim 11 further comprising receiving and mixing said first pressurized solvent and said second pressurized solvent in a mixing chamber before supplying said mixed solvents to said chromatographic system.

22. The method of claim 21 further comprising:

supplying said first solvent to said mixing chamber from said first hydraulic cylinder at a first varying flow rate;

supplying said second solvent to said mixing chamber from said second hydraulic cylinder at a second varying flow rate; and

supplying said mixed solvent from said mixing chamber to said chromatographic system at a constant flow rate.

23. The method of claim 11 further comprising:

supplying a third pressurized solvent from a third hydraulic cylinder to said chromatographic system; and

supplying pressurized hydraulic fluid from a third pump at a substantially constant rate to actuate said third hydraulic cylinder, wherein said third hydraulic cylinder has the composition of said first and second hydraulic cylinders.